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SNAKE POISON

EVERY now and again the British public is horrified by accounts of the famines which periodically carry off myriads of our fellow-subjects in India, but comparatively few have the least idea of the enormous destruction of human life which occurs there from the ravages of wild animals and venomous snakes. In a most interesting lecture recently delivered at a meeting of the Society of Arts by Sir Joseph Fayrer, the lecturer estimated the loss of life at no less than 20,000 human beings and 50,000 head of cattle annually. Wild animals destroy most of the cattle, but venomous snakes kill more human beings than all the wild animals put together. The bites of these reptiles caused the death of 17,000 persons, and over 3,000 cattle in the year 1875, and these figures very probably understate the facts, as the returns upon which they are based are incomplete. The desirability of obtaining an antidote to snake poison is thus evident, and many attempts have been already made to discover one. Another has been added to the already numerous investigations on this subject by Mr. Pedler, who has lately published the results of his research in a paper read before the Royal Society. Before proceeding to seek for the antidote, he endeavoured to analyse the poison chemically, and thus discovered several facts of great interest. The venom of snakes seems to contain very much the same proportion of solids at all times, even under such different climatic conditions as during the wet and dry seasons. It may be kept for two or three months without alteration, but if preserved for a year or eighteen months, it becomes insoluble, and, to a great extent, loses its poisonous qualities. Its composition is very like that of albumen, and, indeed, the dried poison, which looks very like gum arabic, contains about sixty per cent. of albumen, and only forty per cent. at most of the poisonous principle. By the use of solvents, Mr. Pedler endeavoured to separate a crystalline principle, such as Lucien Bonaparte affirmed to be present in the poison of the rattlesnake. His attempts were unsuccessful, and he therefore tried to obtain it by dialysing the poison through parchment paper. Part of the poison dialysed, and part did not. On evaporating the fluid inside the dialyser, the residue formed a gummy mass, with a poisonous action. The water outside the dialyser also gave a similar result, but in it a few crystals could be detected. It was, if anything, rather more poisonous than the ordinary virus. He did not succeed, however, in obtaining any very definite crystalline substance. Ammonia, which has lately been highly recommended as an antidote in snake poisoning, he found, as did Fontana two hundred years ago, to be useless, and indeed its addition to the poison before injection seemed really to hasten death.

Some organic poisons may have their physiological action greatly altered by changing their chemical constitution. Thus strychnia has its action completely altered by combination with iodide of methyl, so that instead of producing convulsions, it causes complete paralysis, like curara. At the same time its deadly power is greatly diminished, and it occurred to Mr. Pedler that the poisonous properties of cobra virus might be diminished in a similar way. On testing this supposition, he found it to be correct, as the poison, after digesting with ethylic iodide, took five times as long to kill an animal as fresh cobra poison would have done. Hydrochloric acid also diminished the activity of the virus, and platinum chloride had a still more powerful action. This salt seems to combine with the poisonous principle of cobra virus, forming with it a yellow amorphous precipitate, which is very insoluble in water, and which has little or no poisonous action. This result of the action of platinum chloride on cobra virus out of the body is most satisfactory; but this apparent antidote has not the same power when the poison has once entered the system. When the poison is injected under the skin and the platinum chloride is injected shortly afterwards into the same spot, death appears to occur even more quickly than when no antidote whatever is used, the second injection seeming to drive the poison before it and to cause it to act more rapidly. When the platinum chloride, however, is injected at the same point, but somewhat more deeply than the virus, so that in passing inwards the poison might come in contact with the platinum, life is considerably prolonged. If a short time elapses between the injection of the poison and that of the platinum, death ensues, even though the interval be only one or two minutes. It would thus seem that when the platinum chloride is brought directly into contact with the poisonous principle of the cobra venom it renders it insoluble and prevents its poisonous action, but that it is not a physiological antidote, and will not counteract the deadly action of the virus after it has once entered the circulation. It may be useful as a local application, but cannot be regarded as an antidote. Every means hitherto tried of counteracting the effects of cobra venom has thus proved ineffectual. Artificial respiration, proposed by Sir Joseph Fayrer and Dr. Lauder Brunton, gave fair promise of success, and by its use the heart may be kept beating for many hours. Indeed in one case an animal apparently dead for many hours has been partially revived by it, yet on no occasion has a fatal issue ever been averted by its use. The experiment just mentioned was performed by a commission appointed by the Indian Government, at Sir J. Fayrer's suggestion, to examine into the modes of preventing death from snake bite. A dog was bitten one afternoon by a water snake, and apparently died about three o'clock. Artificial respiration was at once commenced, and the heart continued to beat, but the animal seemed to be perfectly dead, and the limbs no longer responded to electrical stimuli. Early next morning, however, an alteration took place. The limbs again answered to electricity, voluntary movements occurred, and the eyelids closed not only when the eye was touched with the finger, but when the hand was simply brought near it. This showed that the animal could see the approaching hand, and closed its eyes in order to protect them from the expected touch. The dog seemed to be in a fair way to recovery, but about noon it began to get worse, and finally died at three o'clock on the second day, twenty-four hours after its first apparent death. Whether a combination of artificial respiration with

other appliances may yet enable us to prevent death altogether, is a question which can only be determined by a continuance of those experiments which led to the use of artificial respiration alone. But however valuable such a method as this may occasionally be in saving the lives of English officers, government officials, or persons living within reach of skilled assistance, and who might otherwise be doomed to certain death from the bite of a cobra, it is obvious that it is too complicated to be of much service to the numerous natives who are bitten in localities where no other assistance can be had than that of their comrades, equally ignorant with themselves. If any great diminution is to be effected in the frightful mortality annually resulting from the bites of venomous snakes in India, the remedies must either be so simple and easy of application that they can be used by the most ignorant, or the snakes must be destroyed. The best instructions yet given for the treatment of persons bitten by poisonous snakes are contained in Sir Joseph Fayrer's magnificent work on "The Thanatophidia of India." He recommends that a tight ligature be applied to the limb above the bite, that the bitten part be cut out as quickly as possible, and that the wound thus left be cauterised with a hot coal or hot iron, or touched with nitric or carbolic acid, while brandy or ammonia should be administered internally. Even this treatment, simple though it be, requires knowledge, as well as instruments and skill, which the majority of the natives do not possess. Sir Joseph Fayrer therefore recommends that in every police station and public place plain directions should be printed and hung up, and that at all such places a supply of whipcord, a small knife, a cautery iron, and a bottle of carbolic or nitric acid should be kept, as well as a supply of liquor ammonia for internal administration. But, as Sir Joseph Fayrer says, although comparatively little is to be expected even from this rational mode of treatment, much may be anticipated from prevention, and it is to be effected by making known the nature and appearance of the venomous as distinct from the innocent snakes, and by offering rewards (to be judiciously distributed) for the destruction of the former. The differences between many of the non-venomous and the venomous snakes are not known to the natives, and it is important that a knowledge of such distinctions should be widely disseminated, not only that the venomous ones may be more easily recognised, and thus avoided or destroyed, but in order to prevent death or serious illness from sheer fright, which may frequently result from the bite of a non-venomous species. For this purpose it would be well if the pictures of the chief venomous snakes contained in Sir Joseph Fayrer's work, or cheaper but accurate lithographic copies of them, were displayed in every police station and public place throughout India. Rewards should be paid for the destruction of venomous snakes only, and if these pictures were exhibited in the way suggested there would be little or no excuse for any mistake, either on the part of the natives who killed the snakes, or the officers whose duty it would be to pay the reward. As to the amount of reward, and its mode of distribution, there should, he suggests, be a department, or branch of a department, with a responsible chief and subordinate agents, for whom certain rules should be laid down, to be observed steadily and without hindrance throughout the country, leaving much, as to detail, to the discretion of local authorities. If the destruction of venomous snakes and wild animals in India were intrusted to an officer such as controls the Thuggie and Dacoitee department, he considers that the result would in a few years be as good in the case of noxious animals as it has been in that of noxious men, Thugs and Dacoits.

THE BEETLES OF ST. HELENA

Coleoptera Sanctæ-Helenæ. By T. Vernon Wollaston, M.A., F.L.S. 8vo, pp. i.–xxv., 1–256, coloured plate. (London: Van Voorst, 1877.)

THIS, the last of its lamented author's valuable descriptive works on the geographical distribution of beetles (in personally collecting the material for which, it is to be feared that his physical exertions during a weak state of health induced the attack that ended recently in his death), must have been the most satisfactory to him, on account of the complete isolation of its subject, and his discovery of its most striking endemic fauna. The investigation of the *Coleoptera* of the Madeiras, Salvages, Canaries, and Cape-de-Verdes, with which his name will always be associated, had already resulted in a firm opinion that their peculiar beetle-types could not be satisfactorily referred to any geographical area now existing, but rather to some submerged Atlantic region, of which these groups are the modern representatives; and the results of his exhaustive work at St. Helena cannot have failed to materially strengthen this idea. Curiously enough, also, the most dominant type in this island is one to which Wollaston was always specially devoted, viz., the *Cossonidæ*, a little known family of weevils, whereof the inordinately numerous species here found, consisting of variations of some half-dozen forms occasionally developed to so marvellous an extent as to be almost ludicrous, amply justified his expression (*in litt.*) that he had "tumbled on his legs in this little oceanic preserve of the southern Atlantic."

To any one interested in the faunæ of islands, no better conditions could be afforded than those found in St. Helena. Its vast distance from the nearest continents (nearly 1,200 miles from Africa, and 1,800 from South America) and, indeed, from the nearest island (Ascension, 700 miles), added to its complete severance by a fathomless depth at a mile and a half from its present coast-line, are premises of themselves suggesting the probability of abnormal resident forms; and the peculiar and very dense original vegetation of ebony, redwood, boxwood, *Psiadia*, asters, gumwood, cabbage-palms, tree-ferns, &c., would reasonably be expected to foster a development of special wood-feeding types, to the partia or entire exclusion of other groups. This development, anticipated by Wollaston from the eccentric species received in former years, is wonderfully illustrated by an analysis of the present work. In it, 203 species are recorded, and may probably be taken as very nearly exhausting the fauna, since the author captured, mounted, and examined (with a delicacy, precision, and care peculiar to himself) no less than 10,000 specimens. Of the difficulty attending the collection of such a mass in six months, the author affords an indication by his remark